IS/88/16

MARKET/FEASIBILITY STUDY FOR A PLASTIC BLOW-MOULDING FACILITY IN NEW BRUNSWICK

prepared for

The Department of Commerce & Technology
P O Box 6000
Fredericton, N.B.
E3B 5H1

prepared by

The Research and Productivity Council
P O Box 20,000
Fredericton, NB
E3B 6C2

November 1988

TABLE OF CONTENTS

		Page
EXECUTIVE SUMMARY		
1.0	INTRODUCTION	1
2.0	MARKET DESCRIPTION	2
2.1	Market Segments	4
2.2	Market Growth	14
2.3	Competition	20
3.0	RAW MATERIAL AVAILABILITY AND PRICE	25
3.1	Availability	25
3.2	Price	27
4.0	MANUFACTURING REQUIREMENTS	29
4.1	Blow-Moulding Production Process	29
4.2	Blow-Moulding Equipment	30
5.0	REGULATORY ENVIRONMENT	31
6.0	PRO FORMA BUSINESS PLAN	32
6.1	Strategies	33
6.2	Economic Analysis	35
6.3	Effects of Changing Variables	44
7.0	CONCLUSIONS	50

APPENDICES

A Survey Contacts and References

B Review of PBM Container Impact on the New Brunswick Dairy Industry

C Summary of Blow-Moulding Equipment Suppliers' Quotations

D 5-Year Cash Flow Projections

E Market Survey Results

EXECUTIVE SUMMARY

Total demand for PBM containers in the Maritime provinces market is estimated to be between 18.4 and 22.4 million units and $4.2 - $5.0 million in value. The greatest available demand at present comes from the dairy and food/beverage processing industry with total estimated requirements of approximately 7.4 million units. Other non-food applications comprise an additional 1.4 million units. Over one-half of the 8.8 million unit available market is consumed by the dairy industry and consists of three container sizes - 2, 3.8 and 4 litre.

The size of the market is sufficient to support a blow-moulding business located in New Brunswick. Saint John is the most appropriate location, based on the location of major customers.

A New Brunswick manufacturer, through its proximity to customers, will be able to offer PBM container users lower per unit costs as a result of reduced shipping charges. It is not anticipated that a New Brunswick blow-moulder would have any advantage in raw material on manufacturing costs in comparison with existing suppliers.

The most appropriate target product/market segments for the new supplier are the large-volume users of 2 litre, 3.8 litre and 4 litre containers, primarily the dairy industry. The base case scenario for a business serving these segments indicated an internal rate of return of +21.4% on cash flows over 5 years.

An analysis of sensitivity of the estimated IRR to changes in the variables demonstrated that the business may not be viable without some form of government assistance. Return is also sensitive to the ability of the end-user markets to absorb continued increases in resin costs.

1. INTRODUCTION

In May of 1988 the Research and Productivity Council was commissioned by the New Brunswick Department of Commerce and Technology to undertake a market and feasibility study for a plastic blow-moulding facility to be located in the province. The project was initiated by the department in response to growing private sector interests in the use of plastic containers by a wide range of manufacturing firms in the region and in the potential business opportunity for a New Brunswick manufacturer.

The work plan followed by RPC was intended to provide a comprehensive survey of the market potential for plastic blow-moulded containers in the Maritime provinces and to examine the raw material and manufacturing requirements for serving the identified market. The workplan was also intended to present a pro forma business plan for a hypothetical firm attempting to enter this industry in New Brunswick.

In the course of carrying out this project RPC staff contacted a large number of public and private sector individuals, organizations and companies. The level of co-operation received from these sources in providing information about packaging requirements, suppliers and attitudes were most helpful and greatly appreciated.

2. MARKET DESCRIPTION

The demand for plastic blow-moulded containers in the Maritimes has been estimated in this study through a survey of selected businesses in each province. The firms included in the survey were identified through provincial directories of manufacturers on the basis of their product listings. Firms in the dairy, food and beverage, chemicals and cleaning compounds and petroleum products industries were included. The survey included:

- 18 dairies
- 14 food/beverage processors
- 23 non-food product manufacturers

A complete listing of all companies contacted during the survey is provided in Appendix A.

In total, 31 firms using PBM containers were identified (see Table 1) - 18 in New Brunswick, 11 in Nova Scotia and 2 in Prince Edward Island. Demand is dominated by New Brunswick manufacturers, primarily Irving Oil Co. and the dairy industry, which consume over 90% of all PBM containers in the region. Irving Oil Co. requirements alone are estimated to account for 40-50% of total demand, while the New Brunswick dairy industry consumes an additional 30-35%, as illustrated in Table 2. The total demand for plastic blow-moulded containers in the Maritimes has been estimated to be between 18.5 and 22.5 million units in 1987.

TABLE 1

Number of Firms Using PBM Containers

	New Brunswick	Nova Scotia	Prince Edward Island	Total
Dairies	5	2	1	8
Other Food/Beverage Manufacturers	3	5	-	8
Oil Companies	1	-	-	1
Other Manufacturers	9	4	1	14
TOTAL	18	11	2	31

TABLE 2

Distribution of PBM Requirements by Province (Million Units)

	New Brunswick	Nova Scotia	Prince Edward Island	Total
Dairies	6.0	0.6	0.02	6.6
Other Food/Beverage Manufacturers	0.3	0.8	-	1.1
Oil Companies	8.0-12.0	-	-	8.0-12.0
Other Manufacturers	2.6	0.2	n/a	2.8
TOTAL	16.9-20.9	1.6	n/a	18.5-22.5

2.1 Market Segments

Five major PBM container user groups were identified during the review of the market:

1. Dairy industry
2. Bottled water industry
3. Other food and beverage processors
4. Automotive and related fluids producers
5. Other non-food manufacturers

2.1.1 Dairy Industry

Sixteen Maritime dairies were contacted during the survey. All major New Brunswick dairies package fluid milk in plastic bottles, but PBM milk containers are not approved for use in Nova Scotia or Prince Edward Island. Five dairies use PBM containers for packaging bottled water and fruit juices.

Two PBM container sizes are currently used by the dairy industry in New Brunswick for milk packaging - the 2 litre and 4 litre bottles. Discussions with all NB dairy operators revealed the following current requirements (based on past 12 month usage data) for these containers:

2 litre	3,456,200 units
4 litre	1,075,000
	4,531,200 units

A survey of 300 New Brunswick households (see Appendix E) indicate a somewhat higher demand for plastic jugs, approaching 6.6 million 2 and 4 litre containers. For the purposes of this study the more conservative lower estimate based on dairy consumption of plastic jugs in New Brunswick will be used.

At the present time plastic containers are used only for homogenized and 2% milk. On the basis of estimated container usage and commercial sales of these fluid milk products, it estimated that PBM containers have captured 18% market share by volume of total homogenized and 2% milk sales in New Brunswick.

The survey of New Brunswick consumers addressed user reactions to plastic milk containers. It was determined that:

25% of households regularly buy milk in plastic containers

42% of households have purchased milk in plastic containers occasionally

32% of households have never purchased milk in plastic containers

The primary reasons for non-purchase of milk in plastic containers, apart from simple lack of trial (24% of respondents), are lack of availability in stores or in the sizes desired (25%) and preference for other container types (18%). Other reasons offered include environmental/disposal concerns (12%), difficulty of storage in the refrigerator (7%) and the cost of milk in plastic containers (4%).

When consumers who purchase some/all milk in plastic containers were questioned regarding reasons why more milk is not purchased in these containers, the following responses were offered:

19% no particular reason

18% availability

15% taste of milk in plastic unappealing

12% preference for other containers

9% disposal and/or environmental concerns

8% plastic containers too expensive

5% difficult to store in refrigerator

14% other reasons

The features of plastic jugs most preferred by purchasers were their ease of handling (16% of respondents), re-usability of the containers (10%), non-leaking (9%), ease of opening (8%) and storage (7%). Dislikes about plastic containers include taste of milk (10%), difficulties with disposal or concern about environmental impact (9%). Most users (61%) had no dislikes.

All respondents were questioned regarding any changes they would like to see in plastic containers. Only 9% would change the handles to larger ones and only 7% would prefer a change in shape to facilitate storage in the refrigerator. As illustrated by the survey results, availability of milk in plastic containers appears to be a major factor in non purchase.

A more detailed review of the impact of PBM containers on the dairy industry is provided in Appendix B and survey results are presented in Appendix E.

The requirements of dairies in the region for PBM containers for packaging juices and bottled water are included in the relevant sections below.

2.1.2 Bottled Water

Six Maritime firms, including some dairies, offering spring and mineral water in different types of PBM containers were identified. In total approximately 1.1 million PBM units are currently being used per year, broken down as follows:

3.8 litre(1 US Gal.)	443,000 units
4 litre	273,000
1.5 litre	300,000
Others (970ml,2.5 Gal. 5 Gal.)	49,400
Total	1,065,400 units

2.1.3 Other Food and Beverage Processors

Other food and beverage products packaged in PBM containers include juices, fruit drinks, concentrates, syrups, sauces and dried foods. Juice and drink bottlers are the principal PBM container users in this segment:

Juices/Drinks

2 litre	1,269,400 units
64 ounce	555,000
3 litre	12,000
	1,836,400 units

Other Food Products

250 ml	-
375 ml	20,000
750 ml	70,000
128 ounce	150,000
1 Gallon	45,000
2 litre	2,000
	287,000 units

Total	2,123,400 units

2.1.4 Automotive and Related Fluids

Lubricants and related automotive fluids (e.g. antifreeze, brake and transmission fluid, windshield washer etc.) are packaged in the Maritimes primarily by Irving Oil Co. of Saint John. Other major oil companies contacted during the study indicated that all packaged goods are supplied by their central Canada locations.

The volume of PBM containers consumed by this segment is difficult to estimate accurately due to lack of information about Irving Oil requirements.

A 1984 review of the plastics industry in the Maritimes estimated oil company requirements for PBM bottles at 8 to 12 million per year. In the absence of more accurate information this estimate will be used here, although it is recognized that some growth in these requirements will have occurred during the past four years.

2.1.5 Other Non-Food Products

Sixteen firms in the Maritimes using PBM containers for packaging other non-food products were identified during the study. Products in this category include soaps, detergents, sanitizers, softeners, bleaches and other miscellaneous chemicals. Total demand for PBM containers for packaging these products is estimated at 2.7 million units per year. A range of package sizes and volumes (see Table 3) are required by this segment.

The single largest package type used by this segment of the market is the 4 litre polyethylene windshield washer fluid bottle, estimated at 800,000 units per year. Other major package sizes in this segment include the 16, 24 and 32 ounce bottles, each estimated at 200-300,000 units per year.

2.1.6 Total Demand

The current Maritime market for PBM containers is summarized below:

1. Dairy industry	4,531,200 units
2. Bottled water	1,065,400
3. Other food/beverage	2,123,400
4. Automotive/related	8,000,000 - 12,000,000
5. Other non-food	2,701,900
Total	18,421,900 - 22,421,900 units

TABLE 3

Other Non Food Products

PBM Container Requirements

Size	Number of Users	Total Demand	Range
4 ounce	1	500 units	500 units
16 ounce	1	200,000	200,000
24	1	100,000	100,000
32 ounce	2	300,000	100-200,000
160 ounce	2	300,000	100-200,000
1 gallon	7	122,300	1800-60000
500 ml	1	600	600
1 litre	5	88,500	1500-60,000
2 litre	1	60,000	60,000
4 litre	4	825,500	2500-800,000
5 litre	2	204,500	4500-200,000
Unspecified (5 different sizes)	1	500,000	n/a
		2,7[illegible]900 units	

source: RPC

The products consumed in the largest volumes (excluding Irving Oil Co. requirements) by manufacturers in the region are:

2 litre milk/juice	4,727,600 units
4 litre milk/water	1,348,000
3.8 litre water	443,000
64 ounce juice	555,000
4 litre windshield wash	800,000
Total	7,873,600 units

The five most common PBM products comprise 75% of the total non-Irving demand for containers of this type in the Maritime provinces.

2.1.7 Available Market

The success of any potential new supplier of PBM containers to the Maritime market will depend largely on the available market size. The available market may be defined as the total market demand less the requirements of those users of PBM containers who supply their own needs in-house or have other supply arrangements which make them inaccessible to a new supplier.

Three firms in the region were identified who supply their own requirements through in-house blow-moulding:

- Laurentide Chemicals
- Bristol Myers
- Spa Springs Mineral Water

In addition, Irving Oil Co. representatives contacted during the study have indicated that long-term supply arrangements currently exist with blow-moulding

companies outside the region, and that a new supplier with limited experience in the field is unlikely to obtain contracts with Irving Oil, at least in the short to medium term. Once a local supplier has been established and has a proven track record they may be in a position to supply this large customer. When the requirements noted above are removed from the total market, the estimate of available market, by product application, becomes:

1. Dairy industry	4,531,200 units
2. Bottled water	765,400
3. Other food/beverage	2,123,400
4. Automotive/related	-
5. Other non-food	1,401,900
Total	8,842,900 units

If other users move in the direction of in-house production the available market size will decline, even if total container usage increases.

2.1.8 Market Prices and Shipping Costs

PBM container prices were not readily available, however one dairy in New Brunswick provided the following information on prices of recently ordered containers from a Quebec supplier:

Reported 2 and 4 litre unit costs are:

	2 litre	4 litre
bottle cost	$0.201	$0.325
shipping cost	0.039	0.085
unit cost	$0.240	$0.410

As can be seen, shipping costs comprise an estimated 16% of total unit cost for the 2 litre container and 21% of total 4 litre unit cost. The final cost of the plastic containers would also include a cap (estimated at 3 cents per unit) and label costs (4-5 cents per unit).

Due to the rapidly rising costs of polyethylene resins, regular quarterly, and in some cases monthly, plastic jug price increases have been experienced by all PBM container users contacted.

2.1.9 Market Value

The dollar value of the PBM container market has been increasing steadily with rising resin prices. On the basis of the milk container costs identified above, the following estimated value of the available market has been calculated:

	Volume	Approx. Unit Price	Estimated Value
2 litre milk/juice	4727.6		
64 ounce (1.8 litre)	555.0		
	5322.6	$0.201	$1,069.8 K
4 litre milk/water	1348.0		
3.8 litre bottled water	443.0		
	1791.0	$0.325	$ 582.1
Others	2701.9	$0.201	$ 543.1
TOTAL			$2,195.0 K

The value of the "unavailable" portion of Maritime PBM container demand may be similarly estimated using the milk container unit prices as rough approximations for unit values:

	Volume	Price	Estimated Value
4 litre	800.0	$0.325	$260.0K
Bristol Myers requirements	500.0	0.201	100.5
Spa Springs	300.0	0.201	60.3
Irving Oil	8,000-12,000	0.201	1,608.0 - 2,412.0
TOTAL			$2,028.8 - 2832.8K

The current value of PBM container demand in the region is estimated to be between $4.2 and $5.0 million. This estimate does not include the costs of shipping and applicable sales taxes which must be included to determine purchasers' full costs. As resin costs rise market value will also grow.

2.2 Market Growth

In the United States consumption of high density polyethylene (HDPE) resins for the production of blow-moulded bottles has grown from 807 million kilograms in 1985 to 905 million in 1987, an increase of 18%. In Canada consumption of (HDPE) resins for blow-moulding applications has increased from 69.8 million kg. in 1985 to 73.5 million kg. in 1987, an increase of roughly 5% in two years.

Growth in PBM container demand in the Maritime region will depend upon the strength of the markets for products which are now, or may in the future be packaged in blow-moulded containers. In the remainder of this section the major opportunities for growth in PBM container demand in the Maritime region will be reviewed. For the purposes of this study the requirements of the petroleum industry will not be included due to lack of sufficient information.

2.2.1 Dairy Industry

The New Brunswick dairy industry is the largest consumer of PBM containers in the available Maritime market and represents the greatest potential source of growth in demand. Some possible growth areas are discussed below.

1. Increase in Milk Consumption

Consumption of homogenized and 2% milk in New Brunswick has been relatively flat over the past several years (see Table B2, Appendix B). Between 1985 and 1987 commercial sales increased by less than 1%, with no indications that the market will increase at a faster rate in the future. If current levels of PBM container penetration are maintained then growth in demand for these containers as a result of rising milk

consumption will be roughly 0.5% per year.

2. Increased Penetration of Milk Sales by PBM Containers

Most dairies contacted during the survey indicated that sales of milk in plastic containers reached plateau levels relatively quickly following their introduction. Limited further penetration since that time may be the result of consumer resistance to the price differential between products packaged in the PBM containers and those in the corresponding paperboard or polyethylene bag packages. Any increase in the share of market held by plastic containers might therefore come with lower plastic package costs.

The price differential is based on both the cost of the resins used in manufacturing the plastic bottle and on the shipping cost component of the total bottle cost. Resin prices have been, and are expected to continue, rising sharply, and will offer no opportunity to significantly reduce the package cost differential between plastic and other containers over the coming 2 to 3 years. A local supplier would have a significant advantage in shipping costs over current suppliers to the Maritime market. The savings in shipping costs however may not be sufficient to offset the rising resin costs and may therefore have little impact on the price differential.

Consumer sensitivity to the price differential between plastic and other types of milk packaging may also be restricting growth of market share of plastic containers. If so, no growth in market penetration is foreseen over the coming 2-3 year period as a result of plastic package cost reductions.

3. Extension of PBM Containers to Other Fluid Milk Products

The extension of plastic bottles to other milk products in New Brunswick would provide limited increases in demand for these containers. Skim milk sales in 1987 in New Brunswick totalled 4.2 million litres. No PBM packages are currently used for skim milk, but at present penetration rates the increase in demand for plastic containers in 1987 might have been expected to be slightly more than 300,000 containers (assuming both 2 litre and 4 litre PBM packages):

2 litre	231,000 units
4 litre	73,500
TOTAL	304,500 units

Other low volume fluid milk products, such as buttermilk, table cream, cereal cream and whipping cream are not expected to be packaged in plastic in the foreseeable future.

4. Other Potential Growth Areas for PBM Milk Packaging

It is estimated that 10 - 15% by volume of homogenized and 2% milk sales are made in 1 litre containers. On the basis of this estimate and data from Table B2, 1988 sales of these two products in the 1 litre package size are expected to be between 6.3 and 9.5 million units. Assuming penetration rates for a 1 litre plastic package similar to those achieved by the two litre size, the demand for the suggested new package could range from 2.1 to 3.2 million units per year. Since none of the dairies contacted during the survey indicated any plans to introduce a 1 litre plastic package size it will not be considered here as a growth area for a new blow-moulder in the Maritimes.

In discussions with dairy operators and provincial dairy commissions in Nova Scotia and Prince Edward Island a generally negative attitude towards the introduction of plastic bottles was encountered. It is felt that the prevailing attitudes within these provincial dairy industries will preclude the introduction of PBM milk containers in the other Maritime provinces, at least in the short to medium term.

5. Summary

While there are major potential areas for growth in PBM milk container demand, the most likely sources of growth in the short to medium term are very modest. Growth in milk consumption will produce very small increases in demand for plastic packages, assuming current market shares held by PBM packages are maintained. Significant increases in PBM market shares do not appear likely until the price differential between plastic and other milk packages is reduced.

2.2.2 Other Food/Beverage Packaging Requirements

The bottled water market is considered to be a high growth opportunity for PBM packaging. The International Bottled Water Association has indicated that volume growth in the North American market is currently at 18% per year for mineral and spring waters. Most bottled water packagers in the region currently use PBM bottles and are expected to continue doing so in the future.

On average the Canadian soft drink market increased at a rate of 5.7% in 1987 and is expected to continue to be a strong market. In the Maritime region several bottlers of juices indicated plans or intentions to expand juice production and packaging in PBM containers.

Manufacturers and processors of other food products also indicated intentions to increase or introduce PBM container packaging in the near future, especially if lower-cost sources of containers are available.

2.2.3 Automotive and Other Products

Growth in PBM packaging for automotive products in the Maritime region will depend largely on Irving Oil requirements. Consumption of automotive products in Atlantic Canada is not expected to increase dramatically over the coming five years.

Growth in demand for PBM packaging for other non-food products is not expected to exceed general increases in economic activity in the region.

2.2.4 Demand Forecast

A demand forecast for PBM containers in the Maritime provinces has been prepared on the basis of current usage data, projected future expansion plans of major users in the region identified during the survey and on estimated market growth rates discussed above. The forecast for the 1988 - 1993 period, shown in Table 4, includes the "available" market only.

As can be seen, the total available demand is expected to increase by over 30% in the coming five year period, from 8.78 million units to 11.54 million. The greatest rates of growth are expected in the 3.8 and 4 litre sizes, both of which are popular for packaging bottled water. The demand for the 2 litre size is forecast to increase more slowly at 13% over the forecast period, largely due to very slow growth in annual milk consumption. Nevertheless 2 litre containers will continue to comprise over one half of the total PBM containers consumed by the food and beverage segment.

TABLE 4

Available Market Demand Forecast PBM Containers 1988-1993 (000,000 units)

	1988	1989	1990	1991	1992	1993	5 Year Growth Rate
Dairy/Food/Beverage:							
2.0 litre	4.73	4.87	5.02	5.13	5.24	5.36	+13 %
3.8 litre	0.44	0.47	0.55	0.65	0.77	0.90	+105%
4.0 litre	1.35	1.75	1.88	2.03	2.20	2.41	+79 %
64 ounce	0.56	0.59	0.62	0.66	0.70	0.74	+32 %
Others	0.30	0.35	0.40	0.45	0.51	0.54	+80 %
Sub Total	7.38	8.03	8.47	8.92	9.42	9.95	+35 %
Other Non Food	1.40	1.44	1.47	1.51	1.55	1.59	+14 %
Total	8.78	9.47	9.94	10.43	10.97	11.54	+31 %

Source: RPC

2.3 Competition

The Maritime market requirement for PBM containers in 1987 was dominated by suppliers located outside the region - 91% of the total estimated demand was supplied by at least[1] three blow-moulders, with the remaining 9% supplied by blow-moulding operations located in the region. The regional blow-moulders are primarily involved in filling their own container requirements.

The two principal suppliers to the market (excluding Irving Oil suppliers) are Copak Plastics of Montreal and Bercon Packaging located in Portland, Maine. These firms, as well as a number of smaller suppliers and in-house blow-moulders are briefly profiled below. Table 5 indicates estimated major supplier volumes and market shares by segment.

2.3.1 Copak Plastics

Copak is the dominant supplier to the Maritime PBM market, holding an estimated 84% share of the Maritime food and beverage industry requirements and 44% of the PBM packaging needs of the other non-food market segment.

The Copak head office is located in Montreal, with three separate manufacturing locations in the province of Quebec, all specializing in the production of blow-moulded containers. In total Copak employs between 180 and 250 persons, with estimated sales in 1987 of $15.3 million.

Copak's principal competitive advantages in serving the Maritime market have been their high-volume domestic market base, which supports the

---

[1]. Irving Oil Co. supplier(s) were not identified.

TABLE 5

Market Share Estimate
Major PBM Suppliers

	Dairy/Food/Beverage		Automotive		Other	
	Volume	Share	Volume	Share	Volume	Share
Copak	6.48	84%	-	-	1.13	44%
Bercon Packaging	0.82	10%	-	-	-	-
Ropak Can-Am	-	-	-	-	n/a	n/a
Other	0.13	2%	8.0-12.0	100%	0.11	4%
In-House Supply	0.30	4%	-	-	1.31	52%
	7.73	100%	8.0-12.0	100%	2.56	100%

Source: RPC

high volume production equipment needed to manufacture PBM containers profitably. Their principal competitive disadvantage in the Maritime region is their distance from the marketplace. Since finished blow-moulded containers are very light, but very bulky, per unit shipping costs tend to be high.

2.3.2 Bercon Packaging

Bercon Packaging, located in Portland Maine is a division of W.H.B Acquisitions of Boston Mass., a holding company for seven plastic and blow-moulding operations throughout the northeastern United States. In total W.H.B Acquisition Corp. employs 570 persons and has estimated sales of US$75 million per year. The Bercon Packaging division plant located in Maine employs between 20 and 50 persons and specializes in the manufacture of blow-moulded containers.

Bercon currently supplies 10% of the container requirements of the food and beverage segment, primarily in bottled water and milk packaging.

2.3.3 Other Suppliers

In total "other" suppliers currently account for only 2% of the dairy/-food/beverage segment PBM container demand and 4% of the requirements of other non-automotive products manufacturers.The most significant supplier(s) in this category are those which manufacture PBM containers for Irving Oil Co. These suppliers are located outside the Atlantic region but no other information about them was provided by Irving representatives. Other industry contacts indicated that Irving Oil may be considering the establishment of their own blow-moulding operations, but no formal confirmation was available.

Ropak Can-Am, a subsidiary of US-based Ropak Corp. of Fullerton Calif., is a plastic container manufacturer with facilities located in Springhill, NS and Bishop's Falls, NF. The Springhill facility is primarily engaged in injection moulding, although some blow-moulding for large industrial products is also carried out in Nova Scotia. In the Newfoundland facility blow-moulded 1 and 2 litre milk containers are produced for sale to the Newfoundland dairy industry. Penetration of the Maritime PBM container market by this firm has been extremely limited to date. Ropak has recently announced a major $2.7 million expansion of its facilities in Springhill to enhance their capabilities in injection moulding. The plans do not include expanded blow-moulding facilities in Nova Scotia.

Laurentide Chemicals of Richibucto N.B. supplies its own PBM container requirements in-house. Laurentide also supplies some other users in the region but to date has not aggressively pursued major market opportunities.

2.3.4 In-House Suppliers

As noted in Table 5 companies providing their own PBM container requirements through in-house production comprise only 4% of the dairy/food/beverage segment, but 52% of the other non-food segment. The firms in this category are Laurentide Chemicals, Bristol Myers and Mineral Water Company of Canada.

Laurentide Chemicals is the largest in-house supplier, producing 4 litre windshield washer fluid bottles. Laurentide also supplies a small amount of PBM containers to other users. The Richibucto company is owned by a large paint and chemicals manufacturer in Quebec with extensive experience in blow-moulding, and represents a potential competitor for a

new blow-moulder.

Bristol-Myers in Moncton is strictly involved in blow-moulding for their own requirements and is not felt to be a potential competitor. Similarly The Mineral Water Co. of Canada is engaged in the production of bottled water and is not expected to compete in the blow-moulding market.

3.0 RAW MATERIAL AVAILABILITY AND PRICE

3.1 Availability

The most important consideration for a new entrant to the blow-moulding industry is the availability of HDPE resin. For the past two years, North American polyethylene (PE) plants have been producing at nearly 100% of capacity, but demand has continued to exceed supply. Some established PE buyers are being supplied on an allocation basis, while some PE suppliers, such as Dupont, will not accept new HDPE customers now or in the foreseeable future.

The most frequently cited reason for the PE supply shortage is a similar shortage of ethylene, a key feedstock in the production of PE. It is reported that North American ethylene producers shut down much of their capacity during the 1980-82 recession, and most remain cautious about investing in new plants.

Canadian suppliers of polyethylene were contacted to discuss resin requirements for a blow-moulding facility in New Brunswick. Two suppliers, Dow Chemical Canada Inc. and BASF Canada Inc., indicated a willingness to supply a new customer with blow-moulding grade HDPE. It is noted that Dow produces PE in Canada and has a terminal in the Port of Saint John, while BASF produces in West Germany and will ship truckload quantities from Montreal. Dow has also stated that supporting blow-moulding customers is part of their strategic plan, and that in times of ethylene shortages they will use ethylene in high value products such as HDPE, and cut back on other ethylene-based products.

There appears to be no "official" prediction from the plastics industry as to what the future holds with regard to the availability of PE. The Society of the Plastics Industry of Canada is a logical source for predictions on future availability and prices, but when contacted, representatives stated that their legal counsel has

advised against such forecasts. Discussions with individual resin and equipment suppliers elicited a number of unofficial forecasts. Some individuals thought that only a recession could ease the supply/demand problem, while others reported industry rumors of a slight improvement in 6 months, followed by a return to general availability in 18 to 24 months.

3.2 Price

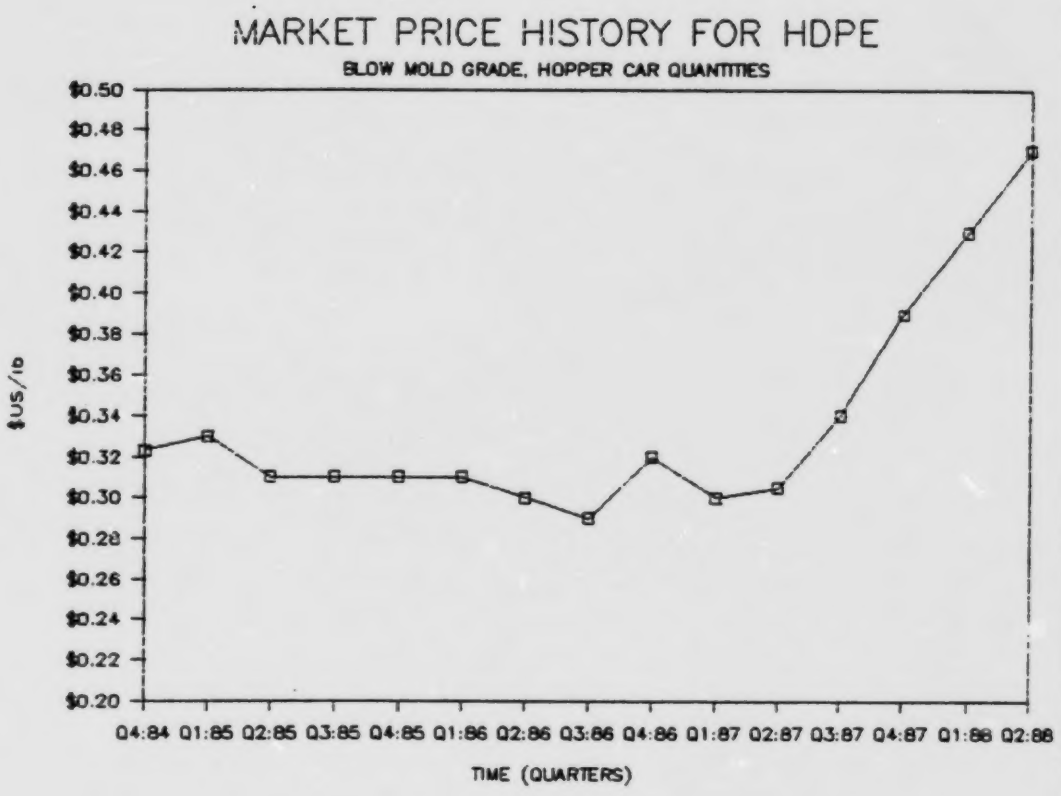
When demand exceeds supply, a normal market response is often price increases. This has certainly been the case for HDPE. Figure 1 presents a market price history for blow-moulding grade HDPE, and shows a 54% price increase in the past year. Industry members are unanimous in predicting that further price increases will occur.

HDPE prices quoted by Dow, BASF, and Dupont are presented below:

Method of Supply	Dow*	BASF	Dupont*
Bulk	$1.76/kg	-	$1.79/kg
Truckload of 25 kg bags	$1.84/kg	$1.75/kg	$1.86/kg
Truckload of 1000 kg boxes	$1.84/kg	$1.75/kg	$1.89/kg

* Includes August 1988 price increases

FIGURE 1



Source: Modern Plastics Magazine

4. MANUFACTURING REQUIREMENTS

The basic blow-moulding process and a review of available production equipment is provided below.

4.1 Blow-Moulding Production Process

The types of plastic containers considered in this study are produced using an extrusion blow-moulding process. The general sequence of production steps, as described in the 1986-87 issue of Modern Plastics Encyclopedia, are as follows:

1. A hopper is loaded, either manually or automatically, with pelletized resin.
2. The resin is melted in an extruder tube.
3. The parison (a round hollow tube of molten plastic) is extruded through a die head.
4. The parison is captured between the two halves of a mold.
5. The parison is expanded with air pressure (usually 100 psi) against the cavity of the mold to form the part.
6. The blown part is cooled with chilled water circulated through passages in the mold.
7. The cooled part is removed from the mold.
8. Excess flash (formed when the parison is pinched together) is trimmed from the part and collected for grinding and re-use.

4.2 Blow-Moulding Equipment

As part of the study, a number of equipment suppliers were contacted to discuss the specifications and prices of appropriate production equipment. A complete list of supplier contacts is included in Appendix A. Certain suppliers, such as Johnson Controls and A.C. Hamilton and Company, were able to quote on the supply of all equipment and accessories. Other suppliers, such as Battenfeld Canada Ltd. and Bekum Plastics Machinery Ltd. provided quotes on the blow molding machines only. All quotations are summarized in Appendix C. It is noted that FGH Systems, a supplier of rebuilt equipment, was also contacted. They could not quote on a particular model since their stock is constantly changing. However, they estimated a minimum savings of 25% over the price of a new machine.

While the equipment offered by all the suppliers is capable of producing the required containers, the prices quoted by Johnson Controls will be used to estimate equipment costs for the new business. Estimated equipment costs are:

2 litre system	$314,200	
4 litre system	$296,600	
Chiller	42,900	
Grinder	14,700	
Regrind storage bins	2,400	
Flame treater	10,000	
Fork lift	30,000	
Office equipment	20,000	
Training by supplier	20,000	
Freight, Insurance, Setup (+50%)	375,400	
TOTAL EQUIPMENT COSTS		$1,126,200

5. REGULATORY ENVIRONMENT

No specific legislation concerning the production of plastic blow-moulded containers was identified. Each of the Maritime provinces has enacted beverage container legislation intended to control the sale and disposal of, primarily, soft drink containers. As part of an increasing concern over environmental problems and increasing interest in the issue of recycling, the current beverage container legislation in all three Maritime provinces is now under review.

The existing provincial beverage container acts do not appear to directly include the plastic milk containers and juice bottles discussed in this report. Other than the necessary provincial dairy commission approvals and the standard federal regulations regarding packaging materials and labelling, there is no specific legislation in place which addresses plastic blow moulded containers. It is expected that all manufacturers of plastic packaging, however, should be prepared for greater future participation in recycling systems, especially in major urban centres.

Discussions with federal agriculture inspectors indicated that users of plastic bottles must ensure that proper, clean storage facilities are provided for empty containers and that means exist for cleaning the containers prior to filling. These requirements point to a need for PBM bottle manufacturers to provide clean packaging for their customers, but they do not apply directly to the manufacturer.

No specific legislation regarding the storage of plastic resins, the blow moulding process or resulting exhausts or effluents were noted. The high density polyethylene resins used in blow-moulding are inert and non-toxic, and the production process itself generates no harmful waste products. All plastic scrap generated by the blow-moulding production system is fully recyclable.

6. PRO FORMA BUSINESS PLAN

On the basis of the foregoing analysis of PBM container markets in the Maritime provinces, the assessment of raw material availability and price, and the review of production equipment available, a pro forma business plan for a start-up PBM container manufacturer serving the regional market has been prepared.

The pro forma plan identifies market, production and location strategies needed to successfully serve the Maritime market. The strategies are followed by an analysis of the anticipated economic performance of the proposed enterprise based on cash flows and pro forma financial statements. The analysis will also include an evaluation of the sensitivity of the results to changes in key variables in order to evaluate some of the risks associated with such a business.

6.1 Strategies

Discussions with PBM container users indicated that while most are generally satisfied with the quality of the containers from current suppliers, there is a great deal of concern about unit costs. Since PBM containers are very bulky, but lightweight, items the per unit shipping costs from suppliers in Quebec tend to be high. As illustrated previously, shipping costs for one New Brunswick dairy purchasing PBM containers ranged from 16% to 21% of the total unit bottle cost.

The primary competitive advantage of a regional supplier in the Maritime market will be a lower total per unit container cost. It is not anticipated that a regional supplier will have lower manufacturing or raw material costs than suppliers in other parts of the country, but it will provide purchasers with significantly lower shipping costs.

The primary target market segment for the proposed blow moulding company will be the high-volume dairy and other food/beverage companies in the Maritimes currently using the 2 litre, 4 litre, and 3.8 litre blow-moulded bottles. This segment comprises the largest portion of the available market in the region and includes a limited number of product sizes.

The geographic distribution of the available and potential market for PBM containers in the Maritimes suggests that the proposed facility be located in Saint John. Reasons for this location include:

- proximity to the largest user in the available market (Baxter Foods Ltd.);
- less than 2 hour travel time to 2 of the 3 remaining major dairy users in New Brunswick;
- proximity to the largest PBM container user (Irving Oil Ltd.) in the region, and
- proximity to a bulk terminal for one major resin supplier (Dow Chemical)

As noted elsewhere the proportion of total bottle costs constituted by polyethylene resins is significant (46 % for 2 litre and 45 % for 4 litre). In recent months record high prices for resins have been established and industry expectations are for continued price increases in the short to medium term. Since material costs are a major component of total container costs, the use of more resin than specified will have a significant effect on total costs. It is therefore vital that production equipment and processes which permit close control of raw material usage be employed in the new facility.

The proposed production plant would be set up to operate 16 hours per day, 5 days per week in year one, and 24 hours per day, 5 days per week thereafter, using two blow-moulding machines. One machine would be dedicated to 2 litre bottle production, while the other would produce 4 and 3.8 litre bottles, as well as any other sizes that may be viable. This arrangement has several advantages:

- 120 hours/week operation will reduce set-up and maintenance costs as well as reducing unit overhead costs.

- dedication of one machine to 2 litre bottle production will eliminate costs related to changing moulds and associated bottle handling systems.

- use of two machines instead of a single machine with higher capacity means that a machine breakdown will not eliminate the plant's entire production capability. The safety factor introduced by this backup arrangement could be a key selling feature in dealing with large accounts.

6.2 Economic Analysis

This section contains an evaluation of the economic viability of a blow-moulding business operating in accordance with an assumed "base case" scenario. This scenario is based on "most likely" 5-year estimates of market penetration, material costs, container prices, container weights, operating and capital costs, and financing arrangements for the proposed business.

Evaluation of the business opportunity will be based on the internal rate of return generated by estimated five year cash flows. At the end of five years it will be assumed, for the purposes of analysis, that the business is closed.

6.2.1 Base Case Scenario

The essential elements of the "base case" scenario are outlined in the following paragraphs.

Market Penetration

It is estimated that the new business will capture 50% of the available market for 2, 3.8, and 4 litre containers in its first year of operation, and 80% in each of the following years. This is illustrated below:

Estimated Sales (Units)

	Year 1	Year 2	Year 3	Year 4	Year 5
2 litre	2,435,000	4,016,000	4,104,000	4,192,000	4,288,000
3.8 litre	235,000	440,000	520,000	616,000	720,000
4 litre	875,000	1,504,000	1,624,000	1,760,000	1,928,000

Material Costs

Based on the predictions of several members of the plastics industry, it is assumed that resin price increases will continue for the next two years, stabilize for a year, and then decrease for the following two years. This is illustrated graphically in Figure 2. It is assumed that resin is purchased in truck load quantities at payment terms of net 30.

Container Prices

It is assumed that the new business will price its containers (f.o.b. plant) at the same level as its competitors in Quebec and Maine. Customers buying from the new business will therefore enjoy the benefits of reduced transportation costs from the manufacturing plant to their facility. Based on information obtained in the market analysis, it is estimated that current container prices are as follows:

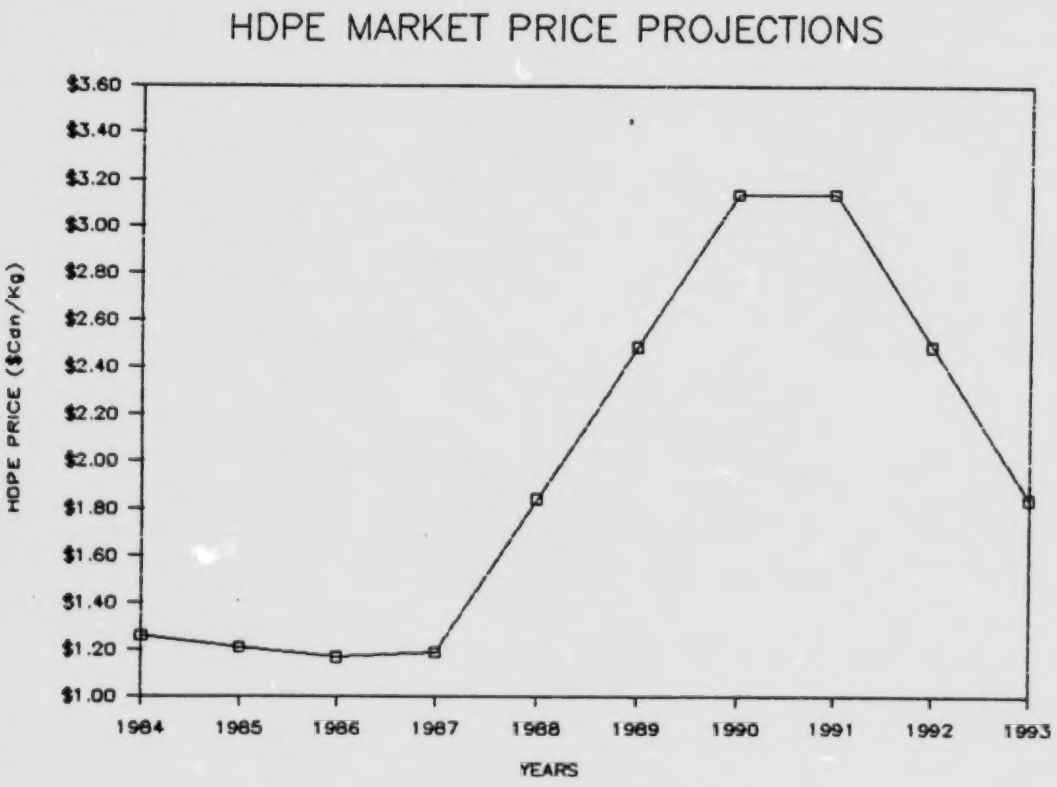
2 litre:	$0.201
3.8 litre:	$0.270
4 litre:	$0.325

It is further assumed that all future HDPE price increases will be immediately passed on to the customer.

Container Weights

Based on information obtained from industry participants, it is estimated that a new supplier of containers to the dairy industry will be required to meet the following weight specifications:

FIGURE 2



Source: RPC

4 litre:	80 g
3.8 litre:	65 g
2 litre:	50 g

Operating and Capital Costs

Assumptions and estimates regarding costs have been made, based on information from equipment suppliers and general manufacturing practices. A 25% salvage value of equipment at the end of 5 years is assumed. These cost estimates are presented in Table 6.

Financing

It is assumed that the $1,676,200 in capital costs will be financed as follows:

Source	Land	Building	Equipment	Total
Equity	$12,500	$125,000	$281,550	$419,050
Bank loan	37,500	125,000	281,550	444,050
Government Assistance	-	250,000	563,100	813,100
Totals	$50,000	$500,000	$1,126,200	$1,676,200

It is further assumed that the bank loans will be structured as follows:

Item	Loan	Amortization	Interest Rate (after "buy down")	Monthly Payment
Equipment	$281,550	5 years	7%	$5,575
Land	37,500	20 years	13%	439
Building	$125,500	20 years	7%	969
TOTAL	$444,050			$6,983

TABLE 6

COST ASSUMPTIONS

Capital Costs	
Building	$500,000
Land	$50,000
Total	$550,000

Equipment Costs	
2 litre system	$314,200
4 litre systyem	$296,600
Chiller	$42,900
Grinder	$14,700
Regrind storage bins	$2,400
Flame treater	$10,000
Fork lift	$30,000
Office equipment	$20,000
Training by supplier	$20,000
Freight,Insurance,Setup(+50%)	$375,400
Total	$1,126,200
TOTAL CAPITAL COSTS	$1,676,200

Operating Costs	YEAR 1 (2 shifts/day)		YEARS 2-5 (3 shifts/day)	
Manager		$50,000		$50,000
Secretary/bookkeeper		$20,000		$20,000
Setup/maintenance		$30,000		$30,000
Machine operators	2@ $20000	$40,000	3@ $20000	$60,000
Handlers	4@ $15000	$60,000	6@ $15000	$90,000
		$200,000		$250,000
Electricity		$48,000		$60,000
Heat		$5,000		$5,000
Telephone		$2,000		$2,000
Insurance		$20,000		$20,000
Professional fees		$8,000		$8,000
Property tax		$10,000		$10,000
Supplies		$5,000		$5,000
TOTAL OPERATING COSTS		$98,000		$110,000

6.2.2 Results

The preceding "base case" assumptions have been used to prepare 5 year pro forma cash flows and income statements for the proposed business, as well as an opening day balance sheet. The cash flows are presented in Appendix D and summarized in Table 7. The income statements and balance sheet are shown in Tables 8 and 9, respectively.

A discounted cash flow analysis of the projections shows the business to generate an Internal Rate of Return (IRR) of 21.4% under the base case scenario, assuming a 25% salvage value of equipment after five years. If the salvage value was zero, the IRR would be 17.0%. Potential investors should compare the IRR value to their required rate of return to determine if the proposed business is attractive to them as an investment.

TABLE 7

SUMMARY OF CASH FLOW PROJECTIONS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
BEGIN. CASH/BANK BAL.	25000	-893	280771	624701	1075609
Sales	904543	1746321	1972700	1951017	1806655
A/R collected	817215	1679441	1962517	1962517	1819305
TOTAL OPER. CASH IN	817215	1679441	1962517	1962517	1819305
Resin purchases	448209	974990	1158409	1088514	888176
A/P paid	468167	954104	1174792	1067813	882250
Labor	130000	180000	180000	180000	180000
Other oper. costs	98000	110000	110000	110000	110000
Administration	70000	70000	70000	70000	70000
Payment on bank loan	83796	83796	83796	83796	83796
Int. on credit line	-6855	-123	0	0	0
TOTAL OPER. CASH OUT	843108	1397777	1618588	1511609	1326046
NET OPER. CASH IN/OUT	-25893	281664	343930	450908	493259
END CASH/LofC BAL.	-893	280771	624701	1075609	1568868

INTERNAL RATE OF RETURN CALCULATIONS

	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CASH FLOW	-863100	-25893	281664	343930	450908	774809
INT. RATE OF RETURN	21.4%					

TABLE 8

PROFORMA INCOME STATEMENTS
BLOW MOLDING OPERATION
Years 1 to 5

	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5	
REVENUE										
Sales		$904,543		$1,746,321		$1,972,700		$1,951,017		$1,806,655
less: Materials	$448,209		$974,990		$1,158,409		$1,088,514		$888,176	
Labour	$130,000	$578,209	$180,000	$1,154,990	$180,000	$1,338,409	$180,000	$1,268,514	$180,000	$1,068,176
Gross Profit		$326,334		$591,331		$634,291		$682,502		$738,478
EXPENSES										
Administration	$70,000		$70,000		$70,000		$70,000		$70,000	
Other expenses	$98,000		$110,000		$110,000		$110,000		$110,000	
Interest: L.T.D.	$31,671		$27,874		$23,800		$19,427		$14,732	
Interest:Credit Line	$6,855		$123		$0		$0		$0	
Deprec: Equipment	$84,465		$84,465		$84,465		$84,465		$84,465	
Deprec: Building	$12,500	$303,491	$12,500	$304,962	$12,500	$300,765	$12,500	$296,392	$12,500	$291,697
Net Income (pretax)		$22,843		$286,369		$333,526		$386,110		$446,781
Percent of Sales		2.5%		16.4%		16.9%		19.8%		24.7%

TABLE 9

OPENING DAY BALANCE SHEET
BLOW MOLDING OPERATION

A S S E T S

CURRENT ASSETS			
Cash		$25.000	
Resin Inventory		$46,000	
Prepaid Expenses		$40.000	$111,000
PROPERTY. PLANT & EQUIPMENT			
Land		$50.000	
Building		$250.000	
Equipment		$563.100	$863,100
TOTAL ASSETS			$974,100

L I A B I L I T I E S

CURRENT LIABILITIES			
Accounts Payable		$46,000	
Line of Credit		$40,000	
Mortgage		$3,396	
Bank Loan		$48,735	$138.131
LONG TERM LIABILITIES			
Mortgage	$162,500		
less: current portion	$3,396	$159,104	
Bank Loan	$281,550		
less: current portion	$48.735	$232,815	$391,919
TOTAL LIABILITIES			$530,050

E Q U I T Y

Equity	$444,050
TOTAL LIABILITIES AND EQUITY	$974,100

6.3 Effects of Changing Variables

The "base case" scenario described previously is based on assumed values for variables affecting the proposed business. This section explores the effects of changes in key variables on the economic feasibility of the business. The changes examined are:

1. the absence of government assistance,
2. selling containers at a higher or lower price than assumed in the base case,
3. selling more or fewer containers than forecasted,
4. being unable to pass all material price increases on to customers.

The effects of these changes on the IRR of the business are summarized in Table 10.

Absence of Government Assistance

The base case assumed that government assistance would be available for 50% of capital costs and for the "buy down" of interest rates to 7%. To estimate the IRR in the absence of government assistance, it is assumed the capital costs would be financed as follows:

Equity	25%	$ 419,050
Bank Loan	75%	1,257,150
	100%	$1,676,200

Assuming a 5 year loan at 13% for equipment and a 20 year mortgage at 13% for the land and building, the IRR of the project becomes -13.1%.

Variation in Container Price

The base case assumed that containers would be priced the same as those from competitors in Maine and Quebec. Customers would have an incentive to buy from the new business because transportation costs would be lower.

Existing suppliers may respond to a new entrant with price reductions in order to retain market share. Conversely, the business may decide to price higher than assumed in the base case such that the customers' delivered cost for their containers is still less than for the competitor's. The effect of a 10% increase or decrease in container prices on IRR is shown graphically in Figure 3.

Actual Sales Volume Differs From Forecast

The base case assumed that sales volumes would be exactly as forecasted. However, since the business has significant fixed costs, selling more or fewer containers than forecasted will affect the operation's IRR. This relationship is illustrated graphically in Figure 4.

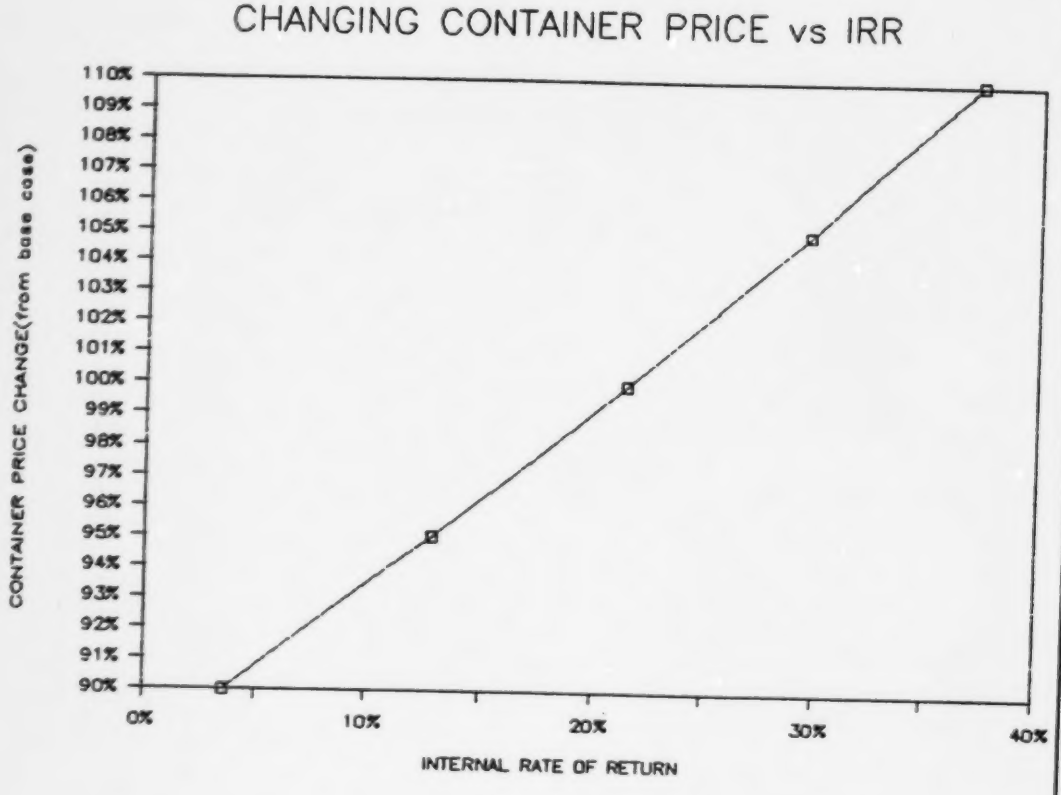
Inability to Pass All Material Price Increases on to Customers

The base case assumed that all material price increases could be passed on to customers, that is, that customers are totally insensitive to price increases. It is possible that this assumption will not hold true in practice, and container manufactures will not be able to pass all material price increases on to their customers. If the new business is forced to absorb a portion of the forecasted material price increases, then its IRR will drop, as shown below:

Portion of Increased Resin Costs That Can be Passed on to Customers

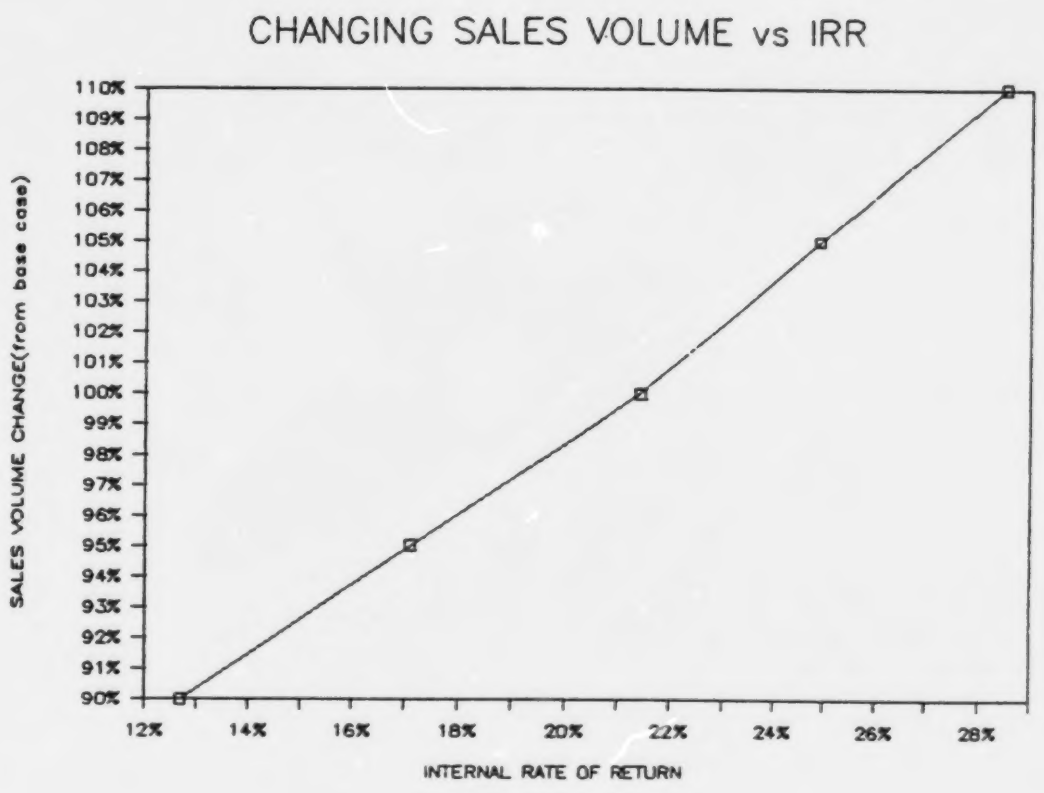
	0 %	50 %	100 %
IRR	-8.7 %	6.5%	21.4%

FIGURE 3



Source: RPC

FIGURE 4



Source: RPC

TABLE 10

Summary of Effects of Changes in Key Variables

		IRR
1.	Base Case Scenario	+21.4 %
2.	$0 Salvage Value in Year 5	+17.0 %
3.	No Government Assistance Available	- 13.1 %
4.	Change in Forecast Container Selling Price	
	a) - 10% of Base Case	+ 3.5 %
	b) + 10% of Base Case	+37.0 %
5.	Change in Forecast Sales Volume	
	a) - 10% of Base Case	+12.5 %
	b) + 10% of Base Case	+37.0 %
6.	Inability to Pass On All Resin Cost Increases	
	a) 0 % of Forecasted Resin Cost Increases	- 8.7 %
	b) 50% of Forecasted Resin Cost Increases	+ 6.5 %

Source: RPC

7.0 CONCLUSIONS

Total demand for PBM containers in the Maritime provinces market is estimated to be between 18.4 and 22.4 million units and $4.2 - $5.0 million in value. The greatest available demand at present comes from the dairy and food/beverage processing industry with total estimated requirements of approximately 7.4 million units. Other non-food applications comprise an additional 1.4 million units. Over one-half of the 8.8 million unit available market is consumed by the dairy industry and consists of three container sizes - 2, 3.8 and 4 litre.

The size of the market is sufficient to support a blow-moulding business located in New Brunswick. Saint John is the most appropriate location, based on the location of major customers.

A New Brunswick manufacturer, through its proximity to customers, will be able to offer PBM container users lower per unit costs as a result of reduced shipping charges. It is not anticipated that a New Brunswick blow-moulder would have any advantage in raw material on manufacturing costs in comparison with existing suppliers.

The most appropriate target product/market segments for the new supplier are the large-volume users of 2 litre, 3.8 litre and 4 litre containers, primarily the dairy industry. The base case scenario for a business serving these segments indicated an internal rate of return of +21.4% on cash flows over 5 years.

An analysis of sensitivity of the estimated IRR to changes in the variables demonstrated that the business may not be viable without some form of government assistance. Return is also sensitive to the ability of the end-user markets to absorb continued increases in resin costs.

APPENDIX A

Survey Contacts And References

SURVEY CONTACTS

Dairies:

1. Baxter Foods Ltd.
   Saint John, N.B.
2. Northumberland Co-op
   Newcastle, N.B.
3. Perfection Dairy Foods Ltd.
   Fredericton, N.B.
4. McKay's Dairy Ltd.
   Moncton, N.B.
5. Graham Farms Dairy
   Centreville, N.B.
6. Dairytown Products Ltd.
   Sussex, N.B.
7. Carleton Co-operative
   Florenceville, N.B.
8. Scotsburn Co-operative Services
   Scotsburn, N.S.
9. Farmers' Co-operative Dairy
   Halifax, N.S.
10. Cornwallis Dairy
    Kentville, N.S.
11. Cook's Dairy Farm
    Arcadia, N.S.
12. Perfection Foods Ltd
    Charlottetown, P.E.I.
13. Amalgamated Dairies
    Summerside, P.E.I.
14. Health Pasturized Milk
    Hunter River, P.E.I.

15. The Pure Milk Co.
    Charlottetown, P.E.I.
16. Purity Dairy
    Charlottetown, P.E.I.
17. Ideal Dairy Ltd.
    Summerside, P.E.I.
18. Maple Leaf Dairy Ltd.
    Summerside, P.E.I.

Other Food/Beverage Processors:

1. Crosby's Molasses Co.Ltd.
   Saint John, N.B.
2. G.E.Barbour Co.Ltd.
   Sussex, N.B.
3. Pizza Delight Corporation
   Moncton, N.B.
4. Sterling Lamoreaux & Sons
   Centreville, N.B.
5. McCain's Foods Ltd.
   Grand Falls, N.B.
6. Bonte Foods Ltd.
   Dieppe, N.B.
7. Sunsational Juice Co.
   Dartmouth, N.S.
8. Mineral Water Co. of Canada
   Halifax, N.S.
9. Scotian Gold Co-operative Ltd.
   Kentville, N.S.
10. Cobi Foods Inc.
    Berwick, N.S.

11. JB Food Industries
    Oakville, Ont.
12. Crystal Springs Ltd.
    Sydney, N.S.
13. Tatamagouche Pure Spring Water Ltd.
    Armdale, N.S.
14. Sparkling Spring Water Ltd.
    Dartmouth, N.S.

Petroleum and Related Products Manufacturers:

1. Irving Oil Co.
   Saint John, N.B.
2. Ultramar Canada Maritime
   Halifax, N.S.
3. Shell Canada Products Ltd.
   Halifax N.S.
4. Texaco Canada
   Halifax, N.S.
5. Petro Canada
   Halifax, N.S.
6. Esso Petroleum Canada Ltd.
   Retail Sales Div.(Warehouse)
   Moncton, N.B.

Other Non-Food Manufacturers:

1. Atlantic Creations
   Minto N.B.
2. Bristol-Myers Manufacturing
   Moncton, N.B.
3. Con-O-Lab Manufacturing
   Richibucto, N.B.

4. Whisco Ltd.
   Fredericton, N.B.
5. Laurentide Chemicals Atlantic Ltd.
   Richibucto, N.B.
6. Cody Food Equipment
   Saint John, N.B.
7. Chemo Pharma Industries
   Woodstock, N.B.
8. St.Anne Chemical Co.
   Nackawic, N.B.
9. Star Industries Ltd.
   Moncton N.B.
10. T.Donovan & Sons Ltd.
    Saint John, N.B.
11. Downeast Chemicals
    Bedford, N.S.
12. Howard Industries
    Dartmouth, N.S.
13. Tibbetts Paints Ltd.
    Trenton, N.S.
14. Advanced Laboratories
    Dartmouth, N.S.
15. Diversey Wyandotte
    Dartmouth N.S.
16. Canso Chemicals Ltd.
    New Glasgow, N.S.
17. Gulfstar Chemicals Corp.
    Hunter River, P.E.I.

Other Contacts:

1. Farm Products Marketing Commission
   Fredericton, NB
   Mr. W. Buffett; Mr. R. Miller
2. NB Milk Marketing Board
   Sussex, NB
   Mr. Sherwood
3. Health Protection Branch
   Halifax, NS
4. NS Dairy Commission
   Truro, NS
   Mr. G. Chant
5. Atlantic Dairy Council
   Armdale, NS
   Mr. J. Sutherland
6. NS Environment Department
   Halifax, NS
   Mr. J. Thorpe
7. PEI Department of Health
   Charlottetown, PEI
   Mr. R. Davies
8. PEI Department of Community & Cultural Affairs
   Environmental Services
   Charlottetown, PEI
   Mr. A. Lavoie
9. PEI Milk Marketing Commission
   Charlottetown, PEI
   Mr. M. Miles
10. PEI Milk Marketing Council
    Charlottetown, PEI
    Mr. P. Telley

11. Agriculture Canada
    Inspections Branch
    Mr. J. Treholme
12. Dairy Bureau of Canada
    Toronto, Ont.
    Mr. R. Bouthillier (Montreal Office)
13. Packaging Association of Canada
    Toronto, Ont.
    Mr. G. Rylot
14. Conservation Council of NB
    Fredericton, NB
    Mr. D. Coon
15. Ropak Can-Am
    Springhill, NS
    Mr. L. MacKinnon
16. Canadian Plastics Institute
    Don Mills, Ont.
    Dr. Bill Taylor
17. Society of the Plastics Industry
    of Canada Inc.
    Don Mills, Ont.
    Mr. Chairman Entine
    Mr. Faris Shammas

SUPPLIER CONTACTS

HDPE Resin

Mr. Herb McGowan, Senior Account Sales Manager
Dow Chemical Canada Inc.
Suite 702
Cogswell Tower, Scotia Square
Halifax, NS B3J 3K1
1-800-565-1256

Ms. Lena Jette
Dupont Canada Inc.
P O Box 2200
Streetsville, Mississauga, Ont.
L5M 2H3
(416) 821-3300
(416) 397-2700

Ms. An Taki
BASF Canada Inc.
5850 Cote de Liesse
Town of Mount Royal, Que.
H4T 1C1
(514) 341-5411

Esso Chemical Canada
4711 Yonge Street
P O Box 4029, Station A
Toronto, Ont. M5W 1K3
(416) 733-5300

Equipment

Mr. Klaus Rank, General/Sales Manager
Bekum Plastics Machinery Ltd.
309 Evans Ave.
Toronto, Ont. M8Z 1K2
(416) 255-2331

Mr. Arjun Bagat, Sales Manager
Hayssen Manufacturing Co.
Hwy. 42N
P O Box 571
Sheboygan, Wis.
53082-0571
(414) 458-2111

Mr. Reg Wheeler
A.C. Hamilton & Co.
5820 Kennedy Road
Mississauga, Ontario
L4Z 1T1
(416) 890-0055

Robin Bock, Product Manager
Johnson Controls Inc.
Plastic Machinery Division
10501 Highway M-52
P O Box 129
Manchester, MI
48158
(313) 428-8371

Mr. Peter Torde
Battenfeld Fischer
940 Westport Crescent
Mississauga, Ontario
L5T 1G1
(416) 676-9384
FAX (416) 676-9387

FGH Industries
2 Richwood Place
Denville, NJ
07834
(201) 625-8114
FAX (201) 625-1442

Mr. Norman Rocheleau
Rocheleau Tool & Die Co. Inc.
117 Industrial Road
Fitchburg, Mass
01420
(617) 345-1723

REFERENCES

1. Atlantic Provinces Economic Council Report
   December 1987
2. Canadian Grocer
   Nov. 1987, p. 13
3. Food in Canada
   May 1988, p. 17
4. Halifax Chronicle Herald
   Nov. 28, 1987
   Sept. 17, 1988
5. Financial Post
   Mar. 14, 1988, p. 9
6. The Daily Gleaner
   Sept. 12, 1987 p. 7
7. Modern Plastics
   January 1987
   January 1988
   April 1988
8. Nova Scota Directory of Manufacturers
   1988-89
   NS Dept. of Industry, Trade & Technology
9. Directory of Manufacturers
   Newfoundland and Labrador 1988
   Government of Newfoundland & Labrador
   Dept. of Development and Tourism
10. Repertoire des Produits Fabriques au Quebec 1987
    Centre de Recherche Industrielle du Quebec
11. Dun and Bradstreet On-Line
12. Directory of Products and Manufacturers 1986
    NB Dept. of Commerce and Technology

13. Directory of Manufacturing and Processing
PEI Development Agency
14. Dairy Market Review 1986
Agriculture Canada
15. The Dairy Review (23-001)
Statistics Canada
16. Modern Plastics Encylopedia
1986-87
17. Ottawa Citizen
August 22, 1988
18. Canadian Plastics Directory and
Buyer's Guide
1987

APPENDIX B

Review of PBM Container Impact on the New Brunswick Dairy Industry

IMPACT OF PBM MILK CONTAINERS IN NEW BRUNSWICK

Plastic milk bottles were introduced in New Brunswick by Baxter Foods Ltd. in 1987, and are now available from all provincial dairies. Most dairies surveyed indicated that sales of milk in plastic bottles reached a plateau soon after their introduction and have remained fairly constant since. Some decline in sales of the 4 litre size were reported by several dairies interviewed and were attributed to the increasing cost differential between the 4 litre PBM container and the 4 litre poly bag.

Consumer Acceptance

Consumer reaction to the plastic bottles has been generally positive, although no formal studies of consumer response were reported by any of the dairies contacted during the survey. It is believed by most dairy representatives contacted that the handle is the most attractive feature of the new containers, making them easier to grasp and pour without spillage. The containers also appear to offer a number of other advantages over traditional packages - less leakage, greater ease of opening and closing, resealability, appearance and the potential for re-use as containers for other household products.

The volume of milk sold in the 2 and 4 litre PBM containers in New Brunswick in 1987 is estimated in Table B1. In combination with the total milk sales data from Table B2, the volume share of the homogenized and 2% milk market held by PBM containers is estimated to be:

2 litre	11%
4 litre	7%
TOTAL SHARE	18%

The 2 litre plastic package is clearly more popular than the 4 litre container. The success of the PBM containers in comparison with other forms of milk

packaging in the three major package sizes is illustrated in Table B3. The estimates are based on limited information from only two dairies, but are beleived to be generally consistent with province-wide trends. As can be seen, PBM containers account for about 33% of volume sales in the 2 litre size, but only 14% in the 4 litre size.

The difference in penetration rates for the 2 and 4 litre containers may be attributed to several factors:

1. The 4 litre PBM container appears to be more difficult to handle than the corresponding 4 litre polyethylene bag. Purchasers of 4 litre bags only have to handle 1 litre at a time which is normally held in a plastic pour pitcher designed to receive the 1 litre bags. In addition the 4 litre bags take much less room to store in the refrigeration than the 4 litre PBM bottle.

2. The 2 litre package size offers significant handling advantages over the corresponding 2 litre paperboard container.It is generally beleived that the 2 litre paperboard container is particularly difficult for children and elderly persons to pick up and pour, especially when it is full.

3. The price premium for milk in 2 litre PBM containers versus paperboard is lower (see Table B4) than the corresponding 4 litre PBM premium versus the cost of milk in a 4 poly bag package. The effects of these higher prices on consumer purchasing decisions is not known. Consumer price sensitivity to the increased prices which may be expected as a result of rising resin costs will be an important consideration for a new PBM container manufacturer.

   It is interesting to note that the PBM container premium identified in Table B4 is greater, on a per litre basis, in the 2 litre size than in the 4 litre size. This may suggest consumers are more willing to trade-off the higher cost for the extra benefits of the 2 litre container, but not for those of the 4 litre container.

TABLE B1

Estimated Milk Sales in PBM Containers
New Brunswick
1987

	Estimated Unit Sales (000)	Estimated Volume of Milk (000 litres)
2 litre size	3,456.2	6,912.4
4 litre size	1,075.0	4,300.0
TOTAL	4,531.2	11,212.4

Source: RPC

TABLE B2

Commercial Sales of Fluid Milk*
1984 - 1988
(000 litres)

	1984	1985	1986	1987	1988 (est)
New Brunswick	63169	62209	62544	62707	63040
Nova Scotia	91275	91972	92071	91857	92315
Prince Edward Island	11839	12001	12080	12112	12210

* NOTE: Includes homogenized and 2% milk only

Sources: Dairy Market Review 1986, Agriculture Canada
The Dairy Review, Statistics Canada (23-001)

TABLE B3

Estimated Distribution of Total 2% + Homogenized Milk Sales by Package Type and Size

	Carton	Poly Bag	PBM
1 litre size	100%	-	-
2 litre size	67%	-	33%
4 litre size	-	86%	14%

Source: RPC

TABLE B4

Comparison of Milk Prices in Regular and Plastic Containers

	Average Jug Price	Average Carton/ Poly Bag Price	Average Jug Premium	Average Premium Per Litre
2 litre size:				
2% milk	$2.367	$2.230	$0.137	$0.685
homogenized milk	$2.430	$2.251	$0.179	$0.895
4 litre size:				
2% milk	$4.653	$4.384	$0.269	$0.673
homogenized milk	$4.712	$4.403	$0.309	$0.773

Source: RPC (survey conducted July 27, 1988)

In addition to a higher per unit cost for plastic bottles compared to cartons or bags, other costs have been incurred:

- higher inventory costs for storing empty PBM bottles. Cardboard and polybag containers are stored in collapsed form and expand to their full size only when being filled.

- higher equipment costs for filling the PBM containers.

- higher labour costs for handling and filling PBM containers since most dairies do not have a fully automated line for plastic bottles.

- higher delivery costs due to less efficient packing of PBM containers than traditional containers in milk delivery vehicles.

Some other disadvantages of PBM containers noted by dairy managers include:

- less space for labelling and brand identification on PBM containers due to limited label size and positioning;

- no room for public service announcements as provided by cardboard cartons;

- possibility of negative environmental impacts from PBM containers in landfill disposal sites or as litter;

- concerns about possible reduction in nutrient content of milk as a result of exposure to fluorescent light in PBM containers.

Industry Acceptance

In general the introduction of plastic milk bottles has not been welcomed by New Brunswick dairies. According to most dairy managers contacted, plastic bottles have not resulted in an expansion of total milk sales but have simply split current sales between a larger number of package types.

Baxter Foods Ltd. has province-wide distribution of its dairy products while most of the other dairies in New Brunswick tend to serve more regional markets. When PBM containers were introduced by Baxter Foods the other dairies felt compelled to introduce them in order to protect their market share. For most dairies the plastic containers appear to have resulted in higher costs without a corresponding increase in profits. Although much of these costs are passed on to the consumer in the price of the milk, other costs incurred have not been recovered.

PBM Containers in Other Maritime Provinces

Introduction of plastic milk bottles in Nova Scotia and Prince Edward Island represent a very large potential growth area for blow moulded containers. If plastic containers were approved in these provinces and levels of market penetration comparable to those in New Brunswick were achieved then the potential additional demand for PBM containers in 1988 may be as high as 7-8 million units.

	2 litre	4 litre	Total Units
Nova Scotia	5.1 million	1.6 million	6.7 million
Prince Edward Island	1.7 million	0.2 million	0.9 million
	5.8 million	1.8 million	7.6 million units

While the potential additional volume in Nova Scotia and Prince Edward Island is significantly greater than current New Brunswick dairy requirements, the likelihood of realizing this potential in the short to medium term is considered to be small. Discussions with the major dairies in these provinces and with provincial dairy commission representatives revealed a negative attitude towards the introduction of plastic bottles for milk in these provinces. These attitudes are strongest in Nova Scotia, but are also prevalent in Prince Edward Island. Without positive support from the dairy commissions and the larger dairies for the introduction of plastic milk containers this potential market will not be realized.

APPENDIX C

Summary of
Blow-Moulding Equipment
Suppliers' Quotations

SUMMARY OF QUOTATION

Supplier: JOHNSON CONTROLS INC.

ITEM	Price
Model 2016 blow molding machine with two die heads	$138,755 US
Impact trimmer and bottle handling system	$58,095 US
Tooling package including two 4 litre molds	$28,815 US
TOTAL	$225,665 US
Model 2016 blow molding machine with three die heads	$145,470 US
Impact trimmer and bottle handing system	$58,910 US
Tooling package including three 2 litre molds	$34,825 US
TOTAL	$239,205 US

OPTIONS

Vacuum loader - 2 resin proportional	$2,090 US
Granulator	$11,290 US
Regrind storage bin	$1,885 US
Chiller to serve 2 machines	$32,990 US
Lifting rings	$390 US
Additional training - 3 weeks	$8,730 US

SUMMARY OF QUOTATION

Supplier: A.C. HAMILTON & CO.

ITEM	Price
Mold clamp unit & base assembly	
Extruder	
Deflashing assembly	
Parison cutting assembly	
Parison programmer	
Speed control	
Single extrusion head	$203,315

OPTIONS

Double extrusion head	$9,965
Misc. double head equipment	$1,692
Double parison cutting assembly	$5,311
Granulator	$11,835
Hopper loader	$1,395
Additive metering system	$1,695
Portable chiller	$21,140
Material conveyor	$3,080

SUMMARY OF QUOTATION

Supplier: BEKUM PLASTICS MACHINERY LTD.

ITEM	
BM 502 blow molder Single extrusion head Basic deflashing system	$287,955 US
OPTIONS	
Double extrusion head with programming adaptor	$33,545 US

SUMMARY OF QUOTATION

Supplier: BATTENFELD CANADA LTD.

ITEM	
FHB 106-2 blow molding machine	$191,265 US
Extruder	$100,000 US
Extruder screw	$9,500 US
Single head die	$24,080 US
	$324,845 US

OPTIONS	
Automatic bottle removal	$9,500 US
Hand held operator station	$2,050 US
Double die head	$39,000 US

APPENDIX D

5-Year Cash Flow Projections

CASH FLOW PROJECTIONS
BLOW MOLDING OPERATION

	YEAR 1 Month 1	YEAR 1 Month 2	YEAR 1 Month 3	YEAR 1 Month 4	YEAR 1 Month 5	YEAR 1 Month 6	YEAR 1 Month 7	YEAR 1 Month 8	YEAR 1 Month 9	YEAR 1 Month 10	YEAR 1 Month 11	YEAR 1 Month 12
BEGIN. CASH/BANK BAL.	25000	-6816	-84565	-85755	-87269	-89102	-91252	-40944	-44245	-47847	-51748	-55945
Production:4 litre	0	79545	79545	79545	79545	79545	79545	79545	79545	79545	79545	79545
Production:2 litre	0	221364	221364	221364	221364	221364	221364	221364	221364	221364	221364	221364
Production:1 USgal	0	21364	21364	21364	21364	21364	21364	21364	21364	21364	21364	21364
Sales price:4 litre	$0.325	$0.329	$0.334	$0.338	$0.342	$0.347	$0.351	$0.355	$0.360	$0.364	$0.368	$0.373
Sales price:2 litre	$0.201	$0.204	$0.206	$0.209	$0.212	$0.215	$0.217	$0.220	$0.223	$0.225	$0.228	$0.231
Sales price:1 USgal	$0.270	$0.274	$0.277	$0.281	$0.284	$0.288	$0.291	$0.295	$0.298	$0.302	$0.305	$0.309
Grams: 4 litre	80	80	80	80	80	80	80	80	80	80	80	80
Grams: 2 litre	50	50	50	50	50	50	50	50	50	50	50	50
Grams: 1 USgal	65	65	65	65	65	65	65	65	65	65	65	65
Resin price ($/kg)	$1.840	$1.894	$1.948	$2.003	$2.057	$2.111	$2.165	$2.219	$2.273	$2.328	$2.382	$2.436
Sales	0	77134	78153	79173	80192	81212	82231	83251	84270	85290	86309	87328
A/R collected	0	0	77134	78153	79173	80192	81212	82231	83251	84270	85290	86309
TOTAL OPER. CASH IN	0	0	77134	78153	79173	80192	81212	82231	83251	84270	85290	86309
Beg. Resin inventory	0	46000	57705	69745	82119	94829	55102	68481	82194	96242	110625	65801
Resin used	0	35649	36669	37688	38707	39727	40746	41766	42785	43805	44824	45843
Resin purchases	46000	47354	48708	50063	51417	0	54125	55479	56833	58188	0	60896
A/P paid	0	46000	47354	48708	50063	51417	0	54125	55479	56833	58188	0
Labor	10833	10833	10833	10833	10833	10833	10833	10833	10833	10833	10833	10833
Other oper. costs	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167	8167
Administration	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833
Payment on bank loan	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983
Int. on credit line	0	-68	-846	-858	-873	-891	-913	-409	-442	-478	-517	-559
TOTAL OPER. CASH OUT	31816	77748	78325	79667	81006	82342	30904	85532	86853	88171	89486	31257
NET OPER. CASH IN/OUT	-31816	-77748	-1191	-1514	-1833	-2150	50308	-3301	-3602	-3901	-4197	55052
END CASH/LofC BAL.	-6816	-84565	-85755	-87269	-89102	-91252	-40944	-44245	-47847	-51748	-55945	-893

CASH FLOW PROJECTIONS
BLOW MOLDING OPERATION

	YEAR 2 Month 1	YEAR 2 Month 2	YEAR 2 Month 3	YEAR 2 Month 4	YEAR 2 Month 5	YEAR 2 Month 6	YEAR 2 Month 7	YEAR 2 Month 8	YEAR 2 Month 9	YEAR 2 Month 10	YEAR 2 Month 11	YEAR 2 Month 12
BEGIN. CASH/BANK BAL.	-893	-11435	26291	523	38583	76868	115377	154111	122694	161877	201284	240915
Production:4 litre	125333	125333	125333	125333	125333	125333	125333	125333	125333	125333	125333	125333
Production:2 litre	334667	334667	334667	334667	334667	334667	334667	334667	334667	334667	334667	334667
Production:1 USgal	36667	36667	36667	36667	36667	36667	36667	36667	36667	36667	36667	36667
Sales price:4 litre	$0.377	$0.381	$0.386	$0.390	$0.394	$0.399	$0.403	$0.407	$0.412	$0.416	$0.420	$0.425
Sales price:2 litre	$0.234	$0.236	$0.239	$0.242	$0.244	$0.247	$0.250	$0.252	$0.255	$0.258	$0.261	$0.263
Sales price:1 USgal	$0.312	$0.316	$0.319	$0.323	$0.326	$0.330	$0.333	$0.337	$0.340	$0.344	$0.347	$0.351
Grams: 4 litre	80	80	80	80	80	80	80	80	80	80	80	80
Grams: 2 litre	50	50	50	50	50	50	50	50	50	50	50	50
Grams: 1 USgal	65	65	65	65	65	65	65	65	65	65	65	65
Resin price ($/kg)	$2.490	$2.544	$2.598	$2.653	$2.707	$2.761	$2.815	$2.869	$2.923	$2.978	$3.032	$3.086
Sales	136845	138423	140002	141580	143159	144737	146316	147895	149473	151052	152630	154209
A/R collected	87328	136845	138423	140002	141580	143159	144737	146316	147895	149473	151052	152630
TOTAL OPER. CASH IN	87328	136845	138423	140002	141580	143159	144737	146316	147895	149473	151052	152630
Beg. Resin inventory	80853	70536	123599	112834	101843	90629	79190	137901	126013	113901	101564	89003
Resin used	72567	74145	75724	77303	78881	80460	82038	83617	85196	86774	88353	89931
Resin purchases	62250	127208	64958	66313	67667	69021	140750	71729	73083	74438	75792	154292
A/P paid	60896	62250	127208	64958	66313	67667	69021	140750	71729	73083	74438	75792
Labor	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Other oper. costs	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167
Administration	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833
Payment on bank loan	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983
Int. on credit line	-9	-114	0	0	0	0	0	0	0	0	0	0
TOTAL OPER. CASH OUT	97870	99119	164191	101941	103296	104650	106004	177733	108712	110066	111421	112775
NET OPER. CASH IN/OUT	-10542	37726	-25768	38060	38285	38509	38734	-31417	39183	39407	39631	39856
END CASH/LofC BAL.	-11435	26291	523	38583	76868	115377	154111	122694	161877	201284	240915	280771

CASH FLOW PROJECTIONS
BLOW MOLDING OPERATION

	YEAR 3 Month 1	YEAR 3 Month 2	YEAR 3 Month 3	YEAR 3 Month 4	YEAR 3 Month 5	YEAR 3 Month 6	YEAR 3 Month 7	YEAR 3 Month 8	YEAR 3 Month 9	YEAR 3 Month 10	YEAR 3 Month 11	YEAR 3 Month 12
BEGIN. CASH/BANK BAL.	280771	243705	292614	341523	390431	439340	409749	458657	507566	556475	526883	575792
Production:4 litre	135333	135333	135333	135333	135333	135333	135333	135333	135333	135333	135333	135333
Production:2 litre	342000	342000	342000	342000	342000	342000	342000	342000	342000	342000	342000	342000
Production:1 USgal	43333	43333	43333	43333	43333	43333	43333	43333	43333	43333	43333	43333
Sales price:4 litre	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429	$0.429
Sales price:2 litre	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266	$0.266
Sales price:1 USgal	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355	$0.355
Grams: 4 litre	80	80	80	80	80	80	80	80	80	80	80	80
Grams: 2 litre	50	50	50	50	50	50	50	50	50	50	50	50
Grams: 1 USgal	65	65	65	65	65	65	65	65	65	65	65	65
Resin price ($/kg)	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140	$3.140
Sales	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392
A/R collected	154209	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392
TOTAL OPER. CASH IN	154209	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392	164392
Beg. Resin inventory	153363	135329	117295	99261	81227	141693	123659	105625	87591	148057	130022	111988
Resin used	96534	96534	96534	96534	96534	96534	96534	96534	96534	96534	96534	96534
Resin purchases	78500	78500	78500	78500	157000	78500	78500	78500	157000	78500	78500	78500
A/P paid	154292	78500	78500	78500	78500	157000	78500	78500	78500	157000	78500	78500
Labor	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Other oper. costs	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167
Administration	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833
Payment on bank loan	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983
Int. on credit line	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL OPER. CASH OUT	191275	115483	115483	115483	115483	193983	115483	115483	115483	193983	115483	115483
NET OPER. CASH IN/OUT	-37066	48909	48909	48909	48909	-29591	48909	48909	48909	-29591	48909	48909
END CASH/LofC BAL.	243705	292614	341523	390431	439340	409749	458657	507566	556475	526883	575792	624701

CASH FLOW PROJECTIONS
BLOW MOLDING OPERATION

	YEAR 4 Month 1	YEAR 4 Month 2	YEAR 4 Month 3	YEAR 4 Month 4	YEAR 4 Month 5	YEAR 4 Month 6	YEAR 4 Month 7	YEAR 4 Month 8	YEAR 4 Month 9	YEAR 4 Month 10	YEAR 4 Month 11	YEAR 4 Month 12
BEGIN. CASH/BANK BAL.	624701	673609	654612	712353	769686	826610	811397	867505	923205	978496	967067	1021542
Production:4 litre	146667	146667	146667	146667	146667	146667	146667	146667	146667	146667	146667	146667
Production:2 litre	349333	349333	349333	349333	349333	349333	349333	349333	349333	349333	349333	349333
Production:1 USgal	51333	51333	51333	51333	51333	51333	51333	51333	51333	51333	51333	51333
Sales price:4 litre	$0.425	$0.420	$0.416	$0.412	$0.407	$0.403	$0.399	$0.394	$0.390	$0.386	$0.381	$0.377
Sales price:2 litre	$0.263	$0.261	$0.258	$0.255	$0.252	$0.250	$0.247	$0.244	$0.242	$0.239	$0.236	$0.234
Sales price:1 USgal	$0.351	$0.347	$0.344	$0.340	$0.337	$0.333	$0.330	$0.326	$0.323	$0.319	$0.316	$0.312
Grams: 4 litre	80	80	80	80	80	80	80	80	80	80	80	80
Grams: 2 litre	50	50	50	50	50	50	50	50	50	50	50	50
Grams: 1 USgal	65	65	65	65	65	65	65	65	65	65	65	65
Resin price ($/kg)	$3.086	$3.032	$2.978	$2.923	$2.869	$2.815	$2.761	$2.707	$2.653	$2.598	$2.544	$2.490
Sales	172278	170516	168753	166991	165228	163466	161704	159941	158179	156416	154654	152892
A/R collected	164392	172278	170516	168753	166991	165228	163466	161704	159941	158179	156416	154654
TOTAL OPER. CASH IN	164392	172278	170516	168753	166991	165228	163466	161704	159941	158179	156416	154654
Beg. Resin inventory	93954	147843	124995	102554	80522	130627	109412	88604	68205	114526	94944	75769
Resin used	100403	98640	96878	95116	93353	91591	89828	88066	86304	84541	82779	81016
Resin purchases	154292	75792	74438	73083	143458	70375	69021	67667	132625	64958	63604	124500
A/P paid	78500	154292	75792	74438	73083	143458	70375	69021	67667	132625	64958	63604
Labor	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Other oper. costs	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167
Administration	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833
Payment on bank loan	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983
Int. on credit line	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL OPER. CASH OUT	115483	191275	112775	111421	110066	180441	107358	106004	104650	169608	101941	100587
NET OPER. CASH IN/OUT	48909	-18997	57741	57333	56924	-15213	56108	55700	55291	-11429	54475	54067
END CASH/LofC BAL.	673609	654612	712353	769686	826610	811397	867505	923205	978496	967067	1021542	1075609

CASH FLOW PROJECTIONS
BLOW MOLDING OPERATION

	YEAR 5 Month 1	YEAR 5 Month 2	YEAR 5 Month 3	YEAR 5 Month 4	YEAR 5 Month 5	YEAR 5 Month 6	YEAR 5 Month 7	YEAR 5 Month 8	YEAR 5 Month 9	YEAR 5 Month 10	YEAR 5 Month 11	YEAR 5 Month 12
BEGIN. CASH/BANK BAL.	1075609	1067017	1130007	1192475	1196235	1257662	1318567	1324826	1384689	1444031	1452790	1511089
Production:4 litre	160667	160667	160667	160667	160667	160667	160667	160667	160667	160667	160667	160667
Production:2 litre	357333	357333	357333	357333	357333	357333	357333	357333	357333	357333	357333	357333
Production:1 USgal	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000
Sales price:4 litre	$0.373	$0.368	$0.364	$0.360	$0.355	$0.351	$0.347	$0.342	$0.338	$0.334	$0.329	$0.325
Sales price:2 litre	$0.231	$0.228	$0.225	$0.223	$0.220	$0.217	$0.215	$0.212	$0.209	$0.206	$0.204	$0.201
Sales price:1 USgal	$0.309	$0.305	$0.302	$0.298	$0.295	$0.291	$0.288	$0.284	$0.281	$0.277	$0.274	$0.270
Cases: 4 litre	80	80	80	80	80	80	80	80	80	80	80	80
Cases: 2 litre	50	50	50	50	50	50	50	50	50	50	50	50
Cases: 1 USgal	65	65	65	65	65	65	65	65	65	65	65	65
Resin price ($/kg)	$2.436	$2.382	$2.328	$2.273	$2.219	$2.165	$2.111	$2.057	$2.003	$1.948	$1.894	$1.840
Sales	160868	158993	157118	155243	153367	151492	149617	147742	145866	143991	142116	140241
A/R collected	152892	160868	158993	157118	155243	153367	151492	149617	147742	145866	143991	142116
TOTAL OPER. CASH IN	152892	160868	158993	157118	155243	153367	151492	149617	147742	145866	143991	142116
Beg. Resin inventory	119253	95820	72908	108705	86836	65487	98785	78479	58694	89492	70749	52527
Resin used	84329	82453	80578	78703	76828	74952	73077	71202	69327	67451	65576	63701
Resin purchases	60896	59542	116375	56833	55479	108250	52771	51417	100125	48708	47354	92000
A/P paid	124500	60896	59542	116375	56833	55479	108250	52771	51417	100125	48708	47354
Labor	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Other oper. costs	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167	9167
Administration	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833	5833
Payment on bank loan	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983	6983
Int. on credit line	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL OPER. CASH OUT	161483	97879	96525	153358	93816	92462	145233	89754	88400	137108	85691	84337
NET OPER. CASH IN/OUT	-8591	62990	62469	3760	61426	60905	6259	59863	59342	8758	58300	57779
END CASH/LofC BAL.	1067017	1130007	1192475	1196235	1257662	1318567	1324826	1384689	1444031	1452790	1511089	1568868

APPENDIX E

Market Survey Results

INTRODUCTION

Baseline Market Research Ltd. was asked by the Research and Productivity Council to estimate demand for and consumer reaction to plastic milk jug containers. This report presents our summary of that information. The methodology employed is included in the Appendix to this report.

RESEARCH FINDINGS

According to the information from this group of survey participants, more households consume 2% milk than either homogenized or skim milk. The consumption patterns are summarized in Table 1.

TABLE 1
HOUSEHOLD MILK CONSUMPTION PATTERNS

TYPE	% OF HOUSEHOLDS BUYING WEEKLY	AVERAGE LITRES PURCHASED WEEKLY
HOMOGENIZED	47%	6.0
2%	59%	5.3
SKIM	17%	3.2

As one can see, however, those households that do purchase homogenized milk consume a slightly higher volume than those purchasing 2% or skim.

The information from Table 1 can be used to estimate the volume of milk consumed by New Brunswick house-

holds. This information is demonstrated in the following table.

TABLE 2
ESTIMATED VOLUME OF MILK CONSUMED
BY NEW BRUNSWICK HOUSEHOLDS

TYPE	% HSLDS	X	% OF HSLDS DRINKING MILK	X	AVERAGE VOL./WK	=	TOTAL WK VOL.
HOMO	47%		220,096		6.0		620,671 L
2%	59%		220,096		5.3		688,240 L
SKIM	17%		220,096		3.2		119,732 L
TOTAL							1,428,643 L

TOTAL YEARLY VOLUME = 1,428,643 X 52 WEEKS = 74,289,436 LITRES

TABLE 2A
ESTIMATED AND ACTUAL VOLUME OF
YEARLY MILK CONSUMPTION

TYPE	BMR ESTIMATES	ACTUAL '87 CONSUMPTION
HOMO	32,300,000 L	28,900,000 L
2%	35,800,000 L	33,700,000 L
SKIM	6,200,000 L	6,200,000 L
TOTAL	74,300,000 L	66,800,000 L

As well, Baseline's estimates consider all milk consumed in New Brunswick including milk purchased in Maine; the 1987 figures above represent sales figures within New Brunswick only. We Caution that these are estimates from a fairly small sample. The variance could be within a range of ± 10%.

It is interesting to note that a relationship exists between the type of milk purchased and the overall

household income: those with a higher household income are more likely to be purchasing 2% milk and those with a lower household income are more likely to be purchasing homogenized milk. The type of milk purchased does not vary in accord with household size or the presence or absence of children.

Each respondent was then asked what size and type of container they usually purchased their milk in. This information is presented in the following table.

TABLE 3
SIZE AND TYPE OF CONTAINER PURCHASED

TYPE	CARTON	JUG	BAG
HOMO			
1 LITRE	8%	--	--
2 LITRE	10%	6%	--
4 LITRE	--	5%	16%
2%			
1 LITRE	13%	--	--
2 LITRE	15%	8%	--
4 LITRE	--	5%	17%
SKIM			
1 LITRE	11%	--	--
2 LITRE	4%	1%	--
4 LITRE	--	1%	2%

It should be noted that there were a small number of respondents who claimed to buy milk in one litre plastic jugs. These purchases have not been included in this table.

In reading this table one can see that households are more likely to purchase homogenized milk in the larger sized containers with those purchasing skim milk more likely to purchase milk in the one litre size.

The information from the preceding tables is used below to project province-wide demand for plastic jug containers.

TABLE 4
DEMAND ESTIMATES FOR MILK CONTAINERS

TYPE	TOTAL HSLDS BUYING MILK	X	% HSLDS BUYING CONT.	X	AVG. CONTAINERS PURCHASED/WEEK	=	OVERALL UNIT DEMAND
HOMO							
2 L JUG	220,096		6%		2.8		36,976
4 L JUG	220,096		5%		1.9		20,909
2%							
2 L JUG	220,096		8%		2.4		42,258
4 L JUG	220,096		5%		2.0		22,010
SKIM							
2 L JUG	220,096		1%		2.0		4,402
4 L JUG	220,096		-%		---		--

Table 4 demonstrates that the estimated weekly demand for plastic milk jugs is 126,555 containers, or 6,580,860 containers per year (4,349,072 2 litre jugs, 2,231,788 4 litre jugs). These demand figures are higher than the actual in-province sales of jugs. This discrepancy may be due to out of province milk

purchases as noted earlier. We also determined that there was a significant difference in the type of containers purchased in different areas of residence. Those households located along the border with Maine (St. Stephen, Woodstock and Edmundston - 17% of the population) are more likely to buy milk in plastic jugs. This difference may be attributed to the fact that many border households purchase milk in Maine because of lower price. Milk from Maine is available in one and two quart jugs as well as one gallon jugs.

One other explanation for the demand differences can be attributed to the fact that the sample is slightly over represented by the larger sized households and correspondingly under represented by single person households (see Table A2 of Appendix).

CONSUMER REACTIONS

Twenty five percent of respondents purchased some or all of their milk in plastic jugs regularly, 42% have purchased milk in plastic jugs on an irregular basis, and 32% have never purchased milk in jugs.

When non-purchasers (32% of all respondents) were asked why they had not bought milk in plastic jugs 24%

stated that there was no particular reason, 18% stated they have always purchased other types of containers or preferred other types of containers, 15% commented that the plastic jugs were not readily available or not delivered by the milkman, 10% indicated that plastic jugs were not available in the size they wanted, 7% expressed concerns that the jugs were difficult to store in the refrigerator, 7% expressed concerns that the jugs could negatively affect the environment, 5% stated the jugs were difficult to dispose of, 4% said the jugs were too expensive, 3% said they did not like the taste of milk in the plastic jugs, 3% claimed they were awkward to handle and 4% indicated other individual reasons for not buying milk in plastic jugs.

People were also asked why they did not buy more of their milk in jugs. Nineteen percent were unable to cite a specific reason, 18% claimed that the jugs were not more readily available or not delivered, 15% indicated they did not like the taste of milk in the jugs, 12% stated they have always purchased other types of containers or preferred other containers, 8% claimed it was too expensive, 8% stated that the jugs were not offered in the size they wanted, 5% indicated

the jugs wee difficult to store in the refrigerator, 5% said they were difficult to dispose of, 4% were concerned about the impact on the environment, 2% mentioned the jugs were awkward to handle, 2% were concerned about the effects of light on the milk and 2% mentioned other individual reasons for not buying more of their milk in jugs.

Those respondents (16%) who indicated that lack of availability was a hindrance to increased purchase of jugs were asked if more jugs and more sizes were available, how it would affect their buying behaviour. Thirty nine percent of households might buy all their milk in jugs, 35% might increase their purchase of jugs somewhat and 26% would be unaffected by increased availability.

Respondents who had at least purchased some milk in plastic containers were asked what they liked about the jugs. Twenty nine percent said that there was nothing in particular they liked, 16% stated the jugs were easy to handle, 10% like the fact the jugs were reusable, 9% liked it that they did not leak, 8% liked the portability and durability of jugs, 8% noted they were easy to open, 7% mentioned the jugs stored

conveniently in the refrigerator, 3% stated the milk stayed fresh, 3% claimed the milk had a better taste in jugs, 3% said that the milk was easier to pour, 2% liked the large sizes available and 2% mentioned other individual reasons.

Jug purchasers were also asked if there was anything they did not like about the jugs. Sixty one percent had no complaints, 10% said they did not like the taste of the milk in jugs, 5% indicated the disposal of jugs was difficult, 4% mentioned environmental concerns, 4% said the product was too expensive, 3% claimed the jugs were difficult to store in the refrigerator, 3% claimed the jugs were poorly sealed or did not like the covers, 3% stated they preferred the other containers, 2% stated they were awkward to handle, 2% did not like the limited size selection and 3% mentioned a variety of individual responses.

All participants, regardless of usage, were asked if there were any changes they would make in various features of the plastic jugs. When asked specifically if they saw any need to change the handles 9% said yes, and most of these wanted a larger handle. Seven percent wanted to see a change in the shape of the

bottles mostly to allow the jugs to be stored more easily in the refrigerator. Ten percent indicated they wanted to see a change in the lids citing either a switch to screw tops or snap on lids. Only 4% wanted to see a change in the color to protect the milk from light.

Each respondent was also asked about their interest in purchasing milk in one and three litre plastic containers. The responses are demonstrated by the following table:

TABLE 5
LIKELIHOOD OF PURCHASING NEW SIZED MILK JUGS

CATEGORY	1 LITRE	3 LITRE
VERY LIKELY	25%	18%
SOMEWHAT LIKELY	22%	15%
NOT VERY LIKELY	53%	67%
	100%	100%

As a final point, each respondent was asked the types of containers they would like to see milk sold in in the future:

--72% want the three types of containers available;

--18% want milk sold only in plastic jugs;

--10% want no plastic jugs available.

APPENDIX

RESEARCH APPROACH

To develop a broad-based measure of market demand in a short period of time Baseline conducted a telephone survey of New Brunswick households.

Baseline used a proportionally allocated random selection procedure in combination with random digit dialing to select households for this study. This method allows access to all possible telephone numbers in New Brunswick. This method has also traditionally produced a sample of households which accurately represents the overall population of an area.

The following number of contacts were made in order to complete the 300 telephone interviews:

Total Contacts	377	
Ineligible Households	17	
Total Eligible Households	360	
Refused to Participate		57
Completes		308

Response Rate - 308/365 = 84%

It must be noted that ineligible households were those which did not purchase any milk on a regular basis.

The representativeness of the sample involved in this study is demonstrated in the following tables which compare the sample to the overall population of New Brunswick.

TABLE A1
GEOGRAPHIC DISTRIBUTION*

AREA	POPULATION	SAMPLE
BATHURST	11%	10%
CAMPBELLTON	5%	5%
CHATHAM	6%	6%
EDMUNDSTON	8%	9%
FREDERICTON	16%	15%
MONCTON	24%	23%
SAINT JOHN	21%	20%
ST. ANDREWS	4%	4%
WOODSTOCK	5%	8%
	100%	100%

TABLE A2
HOUSEHOLD SIZE

CATEGORY	POPULATION	SAMPLE
ONE PERSON	16%	10%
TWO PEOPLE	28%	33%
THREE PEOPLE	19%	22%
FOUR OR MORE PEOPLE	37%	35%
	100%	100%

TABLE A3
HOUSEHOLD INCOME

CATEGORY	POPULATION	SAMPLE
UNDER $15,000	28%	18%
$15-19,9999	11%	15%
$20-24,999	11%	11%
$25-29,999	10%	11%
$30,000+	40%	45%
	100%	100%

*Based on NBTel information.

As is often the case, this sample has an under-representation of both households in the lower income categories and single person households.

In this study we spoke with the person familiar with the groceries purchased for the household. As one might expect, 69% of the respondents (grocery buyers) were female.